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U.S. DEPARTMENT OF AGRICULTURE - FOREST SERVICE
PACIFIC SOUTHWEST FOREST AND RANGE EXPERIMENT STATION

FOREST INSECT CONDITIONS
CLEVELAND NATIONAL FOREST
APPRaisal SURVEY

September 1959

On September 17 and 18, R.C. Hall from the Station accompanied by J.L. Averell from the Region and John Pierce, Area Technical Adviser for the southern California forests, appraised the insect situation in certain critical areas on the Descanso and Trabucco Districts of the Cleveland National Forest.

Earlier this year, Ranger Ed Heilman of the Descanso District submitted a detection report (No. 182-59 dated May 29) calling attention to extensive tip-killing around Corte Madera. In a later report (No. 309-59 dated August 5), Heilman noted a pine engraver infestation in the same area. A similar infestation in the Indian Canyon area on the Trabucco District was reported by Pierce in detection report No. 251-59 dated July 27. Late in the summer the Region advised that both of these situations had worsened and that the assistance of one of the Station entomologists was needed to evaluate the entomological aspects.

Descanso District

The Corte Madera area on the Descanso District contains an isolated stand of mixed Coulter and Jeffrey pine. The tree-killing insect species found in Coulter pine in the area include the western pine beetle, Dendroctonus brevicomis Lec., and the California five-spined engraver, Ips confusus Lec. In Jeffrey pine, the California flatheaded borer, Melanophila californica Van D., and the Oregon pine engraver, Ips oregoni (Eichh.), are the principal pests. The red turpentine beetle, D. valens Lec. is a frequent associate of the species mentioned above.

The Corte Madera area is mixed private and Forest Service ownership. This area has been on a maintenance control basis for the past seven years.

The appraisal showed that the California five-spined engraver is currently in outbreak in Coulter pine over most of the area. Only one tree infested by flatheaded borers was observed in the course of the inspection. From a count of faded trees made from several vantage points it is estimated that about 75 trees have recently been killed by engravers.

This infestation appears to have been triggered by fairly widespread tip-killing early this season, which may have been due to adverse climatic factors or to insects, or to a combination of both. Initially, only a few feet of the top of the tree was affected, but later the California five-spined engraver attacked below this. In many of the trees from 25 to as much as 75 percent of the top apparently was attacked by the first summer generation. Additional damage occurred in the second summer generation when the attacks took place further down the stem. In addition, new trees not attacked in the first generation were infested by the second summer generation.

No logging has been done in the Corte Madera area, and no other source of slash which might serve as breeding material for pine engravers was found despite an extensive survey. Two winters before there had been fairly heavy windfall in this locality, but none in the winter just preceding. This leads to the conclusion that the current infestation developed without building up in slash according to the usually accepted theory.

No other bark beetle was associated with the engravers in the Corte Madera area. The engraver broods appeared to be very aggressive from the limited sampling conducted. Stages ranged from small larvae to callow adults. In one sample where the population was counted, the average number of insects per square foot of bark area was 320. Eighty-two percent were larvae, 16 percent pupae, and 2 percent callow adults. No evidence of predation or parasitism was observed.

Trabuco District

The Indian Canyon area on the Trabuco District is limited to pure Coulter pine, located in rough and relatively inaccessible mountainous country west and north of Lake Elsinore. The insect species here are the California five-spined engraver and to a very limited extent the California flatheaded borer. There is no record of the western pine beetle having ever been found in this locality.

The principal difference between the pine engraver infestation at Corte Madera and the one at Indian Canyon is that in the latter area the beetles generally are killing the complete tree, and broods commonly occur at breast height. In the Corte Madera area complete tree-killing was less common and broods were located in the upper part of the tree. A few broken tops were observed at Indian Valley where a tree had broken off at a stem canker, and these may have contributed to the development of the infestation. An examination of 34 Coulter pines killed by the engraver in 1959 disclosed that 15 had been attacked in varying degrees by the first generation. Eight of these trees had 25 percent or less of the crown killed; 3 had up to 50 percent of the crown killed, and 4 had from 75 to 100 percent of the crown killed. Two of the trees died from these attacks, and all but one of the remainder were killed by the second generation. On the one tree that lived only 10 percent of the crown

remained green. Of the 19 trees initially attacked in the second generation, 14 were killed outright, on three 75 percent of the crown was killed, and on two less than 50 percent was killed. Engraver broods were found in the basal portions of 26 of the 34 trees killed in 1959, six had green bases at breast height, and two were abandoned. In four of the six with green bases pitch tubes could be seen as low as about 10 feet. About one-third of the total estimated currently infested trees were sampled. In the first generation there were 15 trees infested to an average length of 44 percent. In the second generation there were 32 trees infested to an average length of 71 percent.

In the aerial survey of Indian Canyon made by Pierce and Hall on April 20, one group of 55 Coulter pines, apparently completely killed by overwintering broods of insects, was observed. These trees were thought to have been killed by a combination of the pine engraver and the western pine beetle. However, a ground examination of the area by Pierce in early June failed to show any evidence of the western pine beetle. It did confirm that practically all of the trees had been killed and ample evidence of abandoned engraver galleries in the basal portions was found. From these examples, it appears that under some circumstances the California five-spined engraver is capable of killing Coulter pine outright in southern California without any help from any other bark beetle. When this happens, the engraver must be considered in the same category as any other primary bark beetle.

Bark beetle populations in basal portions of 24 currently infested trees, ranging in size from 8 to 26 inches, were examined. Attacks on 15 trees were estimated to be very heavy, 5 had medium attacks, and four had light attacks. No population counts were made because of the loss of most of the brood when the bark samples were taken. Again, as in Corte Madera, evidence of predation, parasitism or disease was not detected. Fourteen trees contained broods in the larval stage only, 5 had larvae and pupae, and 5 larvae, pupae and callow adults. In all cases the currently infested trees were straw colored, and the abandoned portions sorrel to red. The number of currently infested trees in Indian Canyon, determined by viewing the area from vantage points along the Forest highway, is estimated to be over 100. Most of the trees are concentrated in large groups, all on Forest Service land.

Discussion

The survey showed that the California five-spined engraver had been in outbreak status in both the Corte Madera and Indian Canyon areas since early June. The infestations in the two areas were similar in many respects, the principal differences being that in Indian Canyon a higher percentage of the trees were being killed outright, and the size of the average group was larger.

Two generations had already developed in standing trees, and at least one more generation can be expected this fall. The second generation

appeared to have been twice as heavy as the first. Limited examination of brood stages showed evidence of heavy successful populations, with no indication of predation, parasitism or disease in the brood sampled.

Control action is underway at Corte Madera, and the Forest might want to consider the possibility of control in the Indian Canyon area. Since both infestations are very aggressive we would expect continuing heavy loss in both areas if no control action is taken. If control action is taken, we would expect the infestation to be reduced by about 85 percent.

We suggest the use of lindane for treating all trees infested with the pine engraver since this should result in reduced control costs. This would mean transportation of a much smaller amount of spray material and would obviate the need for complete limbing, bucking and rolling the infested trees.

October 12, 1959
Berkeley, Calif.

Ralph C. Hall,
Entomologist